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Association (CHA). Neonatal Intensive Care Unit (NICU) patients were identified from 42 hospitals from 2004 – 2012. NSS was defined by ICD-9 codes reflecting severe sepsis or septic shock, or by ICD-9 codes of infection and organ dysfunction. **Results:** From 2004–2012, 8,724 infants with NSS were identified in 42 children's hospitals. The prevalence of NSS over the 9-year period was 3.0%, while the mortality rate of severe sepsis in these infants was 24.7% and was associated with 15.2% of NICU deaths. Median (IQR) gestation age of infants with NSS was 28 weeks (25 – 36) and median (IQR) length of hospital stay was 57 days (21 – 109). 95.1% of infants with NSS required mechanical ventilation, 90.3% required TPN, 5.5% required ECMO, 0.9% required CRRT and 1.3% required plasma exchange. Comorbidities in NSS patients were most often cardiovascular (60.7%), respiratory (43.4%) and neurologic (14.2%). While there was no change in the annual incidence rate of NSS (3.4% (2004) to 3.5% (2012); p=0.156), there was a decrease in overall mortality (31.2% (2004) to 24.8% (2012); p=0.007). Median cost associated with NSS was $195,418. **Conclusions:** This is the largest NSS specific cohort to date and yearly incidence rates of NSS did not significantly change from 2004–2012. Infants with NSS required prolonged hospitalization and nearly all required significant interventions, most often mechanical ventilation and TPN. Despite overall decline in mortality over time, care of these infants represents a significant financial burden on U.S. healthcare systems.

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ASSOCIATION BETWEEN CRP TREND AND MORTALITY IN PEDIATRIC SEPSIS

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Learning Objectives: Sepsis remains a major cause of morbidity and mortality in children worldwide. The clinical findings and subsequent organ dysfunction in sepsis have classically been viewed as the byproduct of a large, systemic inflammatory response infection. C-reactive protein (CRP) is considered a non-specific inflammatory marker, and studies investigating the association between a single CRP value or trend in CRP values in critically ill adult patients have produced mixed results. The association between CRP trend and mortality has not been described for children with sepsis in the intensive care unit (ICU). **Methods:** A large single-center clinical database was used to screen all critically ill children admitted between 01/2003 and 06/2013 who met 2005 International Pediatric Sepsis Consensus Conference criteria within 24 hours of admission to the pediatric ICU. We compared the first and maximum CRP values obtained within 48 hours of admission (Days 0–2) to the first value obtained between 48–168 hours (Days 2–7) to determine absolute (Second Value - First Value) and relative (Second Value/First Value) change. The Mann-Whitney U test was used to compare initial CRP, maximum CRP, and CRP trends for survivors and non-survivors. **Results:** 135 patient encounters met inclusion criteria. There was no significant difference between median initial or maximum CRP value obtained on Days 0–2: initial CRP 19.05 (mg/dL) for survivors vs 17.9 for non-survivors (p=0.695); maximum CRP 22.15 vs 19.6 (p=0.613). There was no significant difference in absolute or relative change in CRP between the first CRP value and those obtained on Days 2–7: absolute change 2.2 vs 0.6 (p=0.674); relative change 0.816 vs 0.928 (p=0.714). There was no significant difference for CRP trend between the early maximum CRP and the later value: absolute change 4.1 vs 2.5 (p=0.644); relative change 0.711 vs 0.92 (p=0.549). **Conclusions:** In the first seven days of admission there is no association between mortality and initial CRP, maximum CRP within 48 hours of admission, or CRP trend from Days 0–2 to Days 3–7 for children admitted to the ICU with sepsis.

Poster Session: Surgery/Trauma/Burns 1

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USEFULNESS OF BONE SCANNING IN THE DIAGNOSIS OF HIDDEN FRACTURE IN MAJOR TRAUMA PATIENTS

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Learning Objectives: Major trauma patients have high risk of missing fracture due to the low level of consciousness or covered by other injuries. In these cases, bone scan can be helpful in diagnosing the hidden fracture. We investigated the usefulness of bone scan in the diagnosis of hidden fracture of major trauma patients. **Methods:** This study is retrospective study from January 2013 to December, 2013. Major trauma patients who had ISS score of 15 or higher, and had bone scanning were enrolled in this study. The result of bone scan was compared with the CT scan to verify the existence of fracture. We calculate the sensitivity, specificity, positive and negative predictive value of bone scan. Furthermore we stratified the body into four parts which are chest, upper limb, lower limb, spine and compare the results of bone scan between each part. **Results:**Bone scan was conducted to the major trauma patients of 115 out of 304(37.8%) who have ISS >15. For 16 patients, the fracture was not diagnosed before bone scan. In the diagnosis of fracture, the sensitivity was 94%, specificity was 58%, positive predictive value was 63%, and negative predictive value was 92.7%. When the body is separated as four parts, the highest sensitivity was chest part (98.5%) and lowest part was upper limb (86.5%). The specificity of spine was 82.8%, and it was far higher than other three parts. Of total 74 cases of rib fracture, the number of fracture between bone scan and CT are identical in only 9 cases (12%), and different in 65 cases (88%). In cases of different results, bone scan has average 3.9 more number of fractures than that of CT scan. **Conclusions:** Bone scan is useful to screening of hidden fracture of major trauma patients because of its high sensitivity. Also it will be useful to confirm that there is no additional fracture after negative bone scan because of high negative predictive value. In case of upper limb, prudent decision is needed because sensitivity of bone scanning is lower than that of other parts.

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DISPARITY IN TRAUMA AND CRITICAL CARE FOR TRAUMATIC BRAIN INJURY IN ARIZONA

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Learning Objectives: There is limited evidence to assess the public health needs of Traumatic Brain Injury (TBI) in AZ. We hypothesize that there is a disparity in care due to an uneven distribution of trauma centers. **Methods:** The State Trauma Registry was reviewed for patients admitted with TBIs (2008–2012). Our primary outcome was mortality across 4 regions: South, North, Central, and West. We collected data on demographics, injury severity (ISS, GCS), location, mechanism, transportation and disposition. $\chi 2$ and independent student t-test were used to compare categorical and continuous variables, respectively. A multivariate logistic regression analysis was performed to identify factors associated with mortality. Statistical significance was defined at $p<0.05$. Additionally, a 10 question survey assessing TBI care was administered to western AZ ED staff. **Results:** We identified 30,237 patients with TBIs with an average age of 45.8 ± 20.8, 68% were male and a mean ISS of 11.63. 26,214 patients received care at a Level I trauma center. The statewide mortality was 5.6%; however, it was much higher in the South (7%) and West (6.6%). Amongst patients cared for at level I centers, Western patients had the highest mortality (9.6%, $p < 0.0001$). Univariate analysis showed that the geography, level of care, severity of TBI, mechanism of injury, concomitant major surgical procedures, distance to Level I trauma center, age and ISS were predictive of higher mortality rates ($p<0.01$). Multivariate regression analysis showed that West AZ had OR of 1.9 (95% CI 1.2–2.9) for mortality than the reference group after adjustment. Patients with ISS<16 injured in the West had 3.3 fold increase in mortality compared to the rest of AZ (95CI 1.1–10.1). Transfer rates were the highest in the West (79.8%) with only 1.4% transfers via by helicopter. The staff surveyed (n=62) reported no ATLS training (71%), and delays in transfer of 1h or more (58%). **Conclusions:** Western AZ lacks accessibility to higher level of trauma and critical care for TBIs and has a higher mortality rate. Improving trauma systems and staff education may help bridge this gap.

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TRANEXAMIC ACID FOR PEDIATRIC TRAUMA

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Learning Objectives: Tranexamic Acid (TXA) has been shown to decrease mortality in adult trauma. Although TXA has not been reported or studied in pediatric trauma, an increasing number of pediatric centers are employing this medication in massive transfusion (MT) protocols based on adult data. **Methods:** All pediatric trauma patients recorded in the Department of Defense Trauma Registry from 2006–2013 who received a MT (≥40ml/kg all blood product) were

reviewed. Burn patients and those with fatal head trauma (head AIS 6) were excluded. Patients who received TXA (TXA+) were compared to those who did not (TXA-). Primary outcome was in-hospital mortality and secondary outcomes were 24-hour mortality and blood products transfused. **Results:** Of 4327 pediatric trauma patients without burn injury, 507 received a MT. Of these, 59 (11.6%) received TXA. TXA+ and TXA- groups were similar in age, weight, gender, injury severity score, head injury severity, Glasgow Coma Scale, admission temperature, hematocrit, base deficit, INR, and platelet count. Mechanism of injury differed significantly between groups. TXA+ suffered more blast injury (83% vs. 57% p<0.001). TXA- had higher incidence of blunt trauma (11% vs 3.4% p=0.02) and penetrating trauma (32% vs 14% p=0.003). Overall mortality trended lower for TXA+ (8.5% vs 18.3% p=0.055). 24-hour mortality was 3.4% TXA+ vs 6.7% TXA- (p=0.33). TXA+ received more total blood products in the first 24 hours (median 100ml/kg [interquartile range 62.5–161] vs 75ml/kg [51–119] p=0.015] including more pRBC 50ml/kg [29–72] vs 42 [28–58] p<0.001, more FFP 48ml/kg [25–64] vs 33 [21–50] and more platelets 9.7ml/kg [0–20] vs 0 [0–8.6] (p<0.001). **Conclusions:** For MT pediatric trauma patients in a combat setting with more blast injury, there is a trend towards improved mortality in patients receiving TXA, despite possibly higher injury severity as reflected by increased blood product use. These results can help power a prospective trial, which can confirm this trend, balance for mechanism of injury and standardize dose/timing protocols.

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EMERGENT WARFARIN REVERSAL (EWR) COMPARING 3 COAGULATION FACTOR PRODUCTS: PCC3, PCC4, LDRFVIIA

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Learning Objectives: 3-factor prothrombin complex concentrate (PCC3), 4-factor prothrombin complex concentrate (PCC4), and low-dose recombinant factor VIIa (LDrFVIIa) have all been used at our Level 1 Trauma Center for EWR. Data comparing the efficacy and safety of these 3 products are lacking, as are data for specific factor dosing to predict INR response. We compared PCC3, PCC4, and LDrFVIIa for EWR, and thromboembolic (TE) events. **Methods:** Medical records of patients (pts) who received PCC3 (20–50 U/kg), PCC4 (20–50 U/kg), or LDrFVIIa (1000 or 1200 mcg) for EWR from August 2007 to June 2014 were reviewed. Demographics, indication for EWR, INR before and after factor dosing, and factor dose were collected. Primary endpoints were achievement of INR ≤ 1.5 and thromboembolic (TE) events. Data were compared using Kruskal-Wallis, Chi-square or Fisher exact tests as appropriate. For p ≤ 0.05, Bonferroni correction was applied. Data are reported as median [IQR]. **Results:** Included were 198 pts, with 100 PCC3 (dose 20.3[19.1–22.3] U/kg), 35 PCC4 (dose 28.1[25–37.3] U/kg), and 63 LDrFVIIa (dose 1000[1000-1000] mcg). Patient demographics, reason for EWR, and vitamin K use were not different between groups. PCC4 and LDrFVIIa equally achieved an INR ≤ 1.5 and were more effective than PCC3 (34% PCC3, vs. 85.7% PCC4, vs. 81% LDrFVIIa, p< 0.001). TE events were equivalent (5 PCC3 vs. vs. 2 PCC4 vs. 3 LDrFVIIa). Change in INR was greater with PCC4 vs. PCC3 (1.9 vs. 1.2, p=0.003) and PCC4 vs. LDrFVIIa (1.9 vs. 1.5, p=0.016). Fewer PCC4 pts received FFP (61.0% PCC3, vs. 22.9 % PCC4 vs. 57.1% LDrFVIIa, p <0.001). Baseline INR was 3.1 PCC vs. 3.7 PCC4 vs. 2.8 LDrFVIIa, p=0.02; p=0.006 for PCC4 vs. LDrFVIIa). INR after treatment was lower with LDrFVIIa (1.2) than with PCC3 (1.7) or PCC4 (1.4), p<0.001. **Conclusions:** PCC4 and LDrFVIIa were more effective at lowering the INR to ≤ 1.5 compared with PCC3. INR after treatment was lower after LDrFVIIa than PCC3 or PCC4. The blunted INR response observed with PCC3 treatment may be related to less factor VII component. TE events were not different between groups.

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SURVIVAL IMPROVEMENT BY ANTI-RAGE ANTIBODY ADMINISTRATION IN A RAT MODEL OF CRUSH INJURY

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Learning Objectives: Patients with crush injury often result in systemic inflammatory response syndrome (SIRS) leading to multiple organ failure (MOF). The mechanism in which distant organ injuries are caused by local tissue damage is unclear. Receptor for advanced glycation endproducts (RAGE) function as pattern recognition receptors which regulate inflammation. Previously, we showed that rat crush injury induces up-regulation of RAGE expression in the lung. Therefore, we sought to block RAGE signal by administration of anti-RAGE antibody in the crush injury model and evaluated its prognosis. Hypothesis: The treatment targeting RAGE signal by the neutralizing antibody will improve the survival suppressing systemic inflammation against crush injury. **Methods:** Both hindlimbs of anesthetized rats were compressed for 6 h under blocks weighing 3.0 kg and then released. Fluid resuscitation with normal saline (1 mL/kg/h) was performed for the first 5 h, followed by 4 h of reperfusion (10mL/kg/h). Animals were randomly divided into three experimental groups the sham group (SH group, n =6), crush group (CR group, n =20), or anti-RAGE antibody-treated crush group (RA group, n = 20). Blood samples were collected at 3, 6 and 24 h after releasing pressure. The concentration of interleukin 6 (IL-6) in serum was measured with enzyme-linked immunosorbent assay kits. **Results:** Seven-day survival was significantly improved in the RA group than in the CR group. In the CR group, the mean value of IL-6 serum level peaked at 3 h after crush injury and then gradually decreased. The serum level of IL-6 in the RA group was significantly lower compared with that in the CR group with at 3 and 24 h. **Conclusions:**Intravenous administration of anti-RAGE antibody dampened systemic inflammation and improved survival in a rat model of crush injury. These results suggest that RAGE plays an important role in an induction of systemic inflammation following trauma and that therapeutical use of anti-RAGE antibody have a beneficial effect on prognosis of crush injury, preventing the development of MOF.

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THE LUNG NEUTROPHIL TRANSCRIPTOME AFTER TRAUMA INFLUENCES THE WORSE OUTCOMES OF THE OLD TO PNEUMONIA

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Learning Objectives: Old patients who develop ventilator associated pneumonia have significantly worse outcomes than the young. We have shown that old mice have a similar mortality to polytrauma(PT) and pneumonia as their human counterparts, and their BAL cells have defective chemotaxis and phagocytosis after PT. Our hypothesis was that analysis of the BAL leukocyte(WBC) transcriptomic response after PT in both young and old mice could reveal the mechanisms responsible for the increased mortality observed in the elderly. **Methods:** Young(yng) 6–12 wks or old 20–24 mo B6 mice underwent PT. One day later, the mice were sacrificed and their BAL WBCs were isolated. RNA was extracted and genome-wide expression analysis was performed. Genomic expression patterns were compared to BAL WBCs from healthy naïve mice at p<0.001(f-test,p<0.001). Ingenuity Pathway Analysis(IPA), and distance from reference was calculated. **Results:** Transcriptomic analysis of BAL WBCs revealed 1649 genes whose expression differentiated naïve and PT young and old mice. The primary variable affecting gene expression was age, not injury. After PT, the expression of 327 genes(t-test,p<0.001) differentiated between the two age groups with 100% prediction (leave-one out cross validation). Ingenuity Pathway Analysis® after PT supported decreased gene expression regulating phagocytosis. Causal and upstream regulator analysis predicted(-22) that only the elderly would have upstream activation of CD8, as well as inhibition of IL12, TH1 cytokines, CCL5, CCR9, CSF1, IL1, and TLR2/3/4/9. **Conclusions:** Our findings reveal a unique early genomic expression pattern of BAL WBCs consistent with 'immuno-senescence.' Old mice are unable to initiate specific aspects of innate immunity (vs. young mice). Although old mice have a baseline predilection for myelopoiesis, our transcriptomic analysis indicates they are unable to appropriately induce an acute 'emergency myelopoiesis' after PT. The genomic expression patterns of BAL WBCs after PT indicates that more focus should be placed on the mechanisms of altering the aged response to inflammation.

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PREDICTION OF THE ROLE OF OPTIC NERVE SHEATH DIAMETER IN BRAIN EDEMA IN PATIENTS WITH SEVERE TBI

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Learning Objectives: The principle of using optic fundus examination to detect increased intracranial pressure (ICP) was based on the fact that cerebral edema has a centrifuge extension along the optic nerve to the papilla. The aim of this study was to evaluate the role of optic nerve sheath diameter (ONSD) in the diagnosis, follow up, response to treatment and prognosis for patients with severe traumatic brain injury (TBI) presented with brain edema. **Methods:** A prospective observational study was conducted on 60 severe TBI patients admitted to intensive care unit (ICU). Demographic and clinical data and laboratory investigations were obtained on admission. CT brain scan results were recorded on